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ANNUAL REPORT

OF THE

GEOLOGICAL SURVEY

OF

ARKANSAS,

FOR 1887.

BY JOHN C. BRANNER, PH. D.,
STATE GEOLOGIST.

LITTLE ROCK, ARK.:
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OFFICE OF THE GEOLOGICAL SURVEY OF ARKANSAS,
Little Rock, November 30, 1887.

His Excellency, SIMON P. HUGHES, Governor:

SIR—In compliance with the law which requires that the State Geologist shall make an annual report of progress on or before the first Monday in December, I have the honor to transmit herewith a statement of the work of this survey.

I beg, at the same time, to thank you for the support and co-operation I have at all times received at your hands.

I have the honor to remain, with great respect,
Your Excellency's obedient servant,

JOHN C. BRANNER,
State Geologist.

ANNUAL REPORT

OF THE

STATE GEOLOGIST.

A valuable geological report cannot be written without an abundance of facts, and the accumulation of these facts requires time and labor. Although a vast amount of useful information has been accumulated, and a great deal of valuable work accomplished during the brief existence of this survey, there has not been time to digest these facts, to write the reports and to prepare the maps and sections, to say nothing of the time necessary for the engraving of maps and illustrations, or the printing and binding of the reports.

In view of its importance, every effort possible has been made to complete Dr. Comstock's report upon Garland and Montgomery counties in time for the first annual report, but this very importance, as well as the vast amount of material and facts collected, have made its completion in so short a time a physical impossibility.

The same is true of all the other reports. It becomes necessary, therefore, to publish this brief statement, leaving the bulky reports which require illustrations, etc., for the next annual, which will be published at as early a day as possible.

The State Geologist was appointed and confirmed in March, and entered upon his duties June the 24th of the present year. The law provides for three regular assistants. The following regular appointments have therefore been made:

Theodore B. Comstock, Assistant Geologist.

Richard N. Brackett, Chemist.

Charles E. Taft, Topographer.

Upon the completion of his field work and the principal part of his report, Dr. Comstock resigned his position upon the survey, and Mr. Arthur Winslow was appointed Assistant Geologist and placed in charge of the coal fields of the State.

The following persons have done valuable service for the survey in the capacities of volunteer assistants:

Dr. O. P. Hay, Professor of Natural History in the Butler University, Irvington, Ind.

Mr. Charles H. Bollman, Museum Assistant, University of Indiana, Bloomington.

Mr. F. V. Coville, Instructor in Botany, Cornell University.

Dr. F. W. Simonds, Arkansas Industrial University, Fayetteville.

Robert T. Hill, U. S. Geological Survey.

Prof. J. H. Shinn, Little Rock, Ark.

Gilbert D. Harris, Jamestown, N. Y.

Assistance of the highest importance and value has also been received from the United States Coast Survey and from the United States Geological Survey.

THE WORK OF THE STATE GEOLOGIST.

The time of the State Geologist has been given largely to the organization of the corps, the fitting out of the various departments of the survey with proper apparatus and supplies, and the planning and general direction of the work both in the field and the office. The time that it has been possible to take from these duties has been spent in reconnoissance in Independence, White, Jackson, Clark, Washington, Carroll and Madison Counties, and upon the geology in the vicinity of Little Rock. As soon as the topographic sheets are complected, he will finish his work upon the geology of this region and take up that of the following localities: Hot Springs, Searcy, and Batesville. The general affairs of the survey will require less of his attention in the future, and he hopes to have a preliminary geological map of the State ready for publication in the next annual report in addition to the detailed work upon the regions referred to.

THE WORK OF THE ASSISTANT GEOLOGISTS.

DR. COMSTOCK.

The excitement existing both in this State and in mining circles outside the State regarding the reported discovery of gold and silver in certain counties of Arkansas, and especially in those of Garland and Montgomery, seemed to demand a thorough investigation and an unbiased report upon the region in question. It was with a view of placing this work in his hands that Dr. Comstock was appointed, his training and experience as a geologist and a scientific man especially fitting him for such work. Dr. Comstock reported at this office June 28th, and proceeded with his field work as soon thereafter as possible. He visited all, or nearly all, the openings of importance in the State said to yield gold or silver, collecting by direct, personal observation whatever information was necessary to the formation of a trustworthy opinion regarding the values and prospects of these workings.

Dr. Comstock's field work was finished in September, and he returned to his own laboratory at the University of Illinois, to work up and report the results of his investigations

In September Dr. Comstock handed in his resignation, which was with great reluctance accepted, to take effect October 31st. His report is still in process of preparation, and promises to be one of interest and value to the State, and to capitalists as well as to geologists.

MR. WINSLOW.

To fill the vacancy caused by the resignation of Dr. Comstock, the State Geologist sought as an assistant geologist a a man to whom he could confidently entrust the highly important geological work to be done in the coal fields of the State, and Mr. Arthur Winslow, geologist and engineer, of Raleigh, N. C., was eventually selected for this work, and entered upon his duties November 1st. Mr. Winslow is now making a reconnoissance of the coal regions of Arkansas, and we may feel assured that this important part of the geology of the State will receive the attention to which it is entitled, in so far as the means at the disposal of the survey makes such an examination possible.

THE WORK OF THE CHEMIST.

Dr. R. N. Brackett, of Charleston, S. C., a graduate of Johns Hopkins University, was appointed chemist, and entered upon the duties of his office August 20th. Since that time he has been engaged in assaying and otherwise examining and reporting upon the large and important collections made by Dr. Comstock, in the analyses of soils, marls, mineral waters, the well waters of Little Rock, and the water of the Arkansas River at various stages.

A part of the chemist's time has also been given to the microscopic study of the crystalline rocks of Arkansas, and it is hoped that during the coming year he may be able to devote sufficient time to this work to enable him to complete a valuable report thereon.

THE WORK OF THE TOPOGRAPHER.

Mr. Charles E. Taft, late of the Arkansas River Survey, was appointed engineer of the survey and entered upon his duties September 1st. Some delay in beginning the topographical work was caused by the inability of the firm of which the instruments had been ordered to fill the orders promptly. This time was employed by Mr. Taft in doing necessary preliminary work. He will be occupied principally in the construction of such detailed topographic maps as are indispensable to the making of trustworthy geological maps in certain limited areas. The first map of this character to be made by the survey will be of the region in the immediate vicinity of Little Rock, and will include an area of one hundred square miles.

The triangulation, the first essential in the construction of such a map, has already been completed, and the topographic details are now being filled in as rapidly as possible.

When the Little Rock area shall have been completed, other regions will be taken up and mapped in the same manner, and afterwards the geology will be displayed upon these maps. Owing to its geologic and economic importance, it is probable that the region about the Hot Springs will be taken up next in order.

In addition to the regular topographic work done by Mr. Taft, he has compiled from the records in the office of the State Land Commissioner, copies of the oldest surveys, showing the ancient channel of the Arkansas River from Little Rock to its mouth. This old survey has been placed upon a single sheet, and upon the same sheet, and overlying it, is placed the map of the river recently made by the United States Corps of Engineers under Capt. H. S. Taber. The meanderings of the stream are thus brought out as clearly as possible.

I have also requested Mr. Taft to carry on during the year a series of experiments for the purpose of determining the amount of material both in suspension and solution being carried down by this river annually. This will be done without interfering in any way with the regular work of the survey.

In connection with the topographic work it is proper to mention

THE WORK OF THE U. S. COAST SURVEY.

The position of the contours (the lines which will show the elevations of all points above tide level) upon these maps cannot be satisfactorily determined without a line of accurate spirit levels carried from mean tide water into the region to be surveyed. The datum for these levels, in case no high degree of accuracy were demanded, might be taken from the railway surveys that pass through the State, but the accuracy desired in this work does not admit of ordinary railway levels being used. At the same time, the running of accurate lines of spirit levels, especially over such long distances, is too expensive for a State geological survey, and especially for one having but a small contingent fund.

In order, however, that the topographic work of the survey might have permanent value in every respect, the Superintendent of the United States Coast Survey was urged to furnish the necessary datum of elevation. Although the appropriations of the Coast Survey available for work of this character had already been alloted, the Superintendent, in view of the urgent wants of this survey, sent a party into this State for the purpose of connecting Little Rock with the Gulf of Mexico by an accurate line of spirit levels. The part required to complete this line, (that between this city and Arkansas City), will be finished during the present winter, and the results placed at the disposal of this survey.

The Superintendent of the Coast Survey has also been requested to determine points in this State by triangulation, and if the usual appropriations for such work are made by Congress, this State will get a proper share of the benefits to be derived from such work during the continuation of the geological survey.

THE WORK OF VOLUNTEER ASSISTANTS.

It is customary for young men who expect to become professional geologists, and who have already studied the theoretical part of the subject, to volunteer their services upon geological surveys for the purpose of getting a practical acquaintance with the methods pursued in such scientific work and to familiarize themselves with geology in the field. Such assistants, when they are in every respect worthy of confidence and encouragement, are gladly received by the geological surveys and their field expenses paid in return for the services they are able to render. This survey has been very fortunate in having received valuable services from the volunteers already named.

MESSRS. HAY AND BOLLMAN.

The work of Dr. Hay, in which he was assisted by Mr. Bollman, was the tracing of the demarkation of the cretaceous deposits in the southwestern part of the State from where it leaves the Ouachita River to the western boundary of the State. They began their work July 11th, traveled over a thousand miles, much of the time on foot, and finished their work August 30th, in a most satisfactory manner. The report of Dr. Hay upon this work is complete and in the hands of the State Geologist, but it could not be printed in time for the first annual report.

MR. COVILLE.

Mr. Coville was assigned work in Independence County. Unfortunately he was taken ill before he could finish his work, and was obliged to return to his home. The observations made by him, however, will be made available in future work upon Independence County. Mr. Coville made many interesting and valuable observations upon the influence of geological formations upon the growth and distribution of plants.

DR. SIMONDS.

Dr. Simonds has used such time as he could command outside of his regular duties in the State University, studying the geology of the region about Fayetteville, but this time has necessarily been brief. During the next two months vacation he will be employed as a local assistant, and will give his entire time to the geology of Washington County, and will probably extend his work, if the time admits, into the adjacent counties.

MR. HILL.

Mr. Hill is placed nominally in the list of volunteer assistants on account of his relations to this survey. These relations will be understood from the following. In July last, the State Geologist, convinced of the inadequacy of the appropriation for the survey, and of the great importance of the field to be reported upon, asked for the co-operation of the United States Geological Survey, and later went east for the purpose of conferring personally with the Director, and obtaining whatever assistance could be had. As one of the results of this interview, Mr. R. T. Hill, one of the assistants of the United States Survey, was directed to report for work in this State, the Arkansas Survey to pay his field expenses only. By such an arrangement we were able to secure the services of an experienced geologist, at the nominal expense of a volunteer assistant. Mr. Hill reported at this office September 5th, and was assigned to work in Clark County, and later to the extension of his work in the counties south and west within the mesozoic region. Mr. Hill's work has thrown much light upon the geologic structure of that portion of our State, and his report, which is nearly complete, will, when published, form an important chapter in the geology of the State of Arkansas.

PROF. SHINN.

Prof. Shinn has undertaken to compile the statistics and other information regarding the mine products of the State. This information will be useful as indicating what has already been accomplished in the development of our important mining industries.

MR. HARRIS.

Mr. Harris entered upon his work November 15th, and was assigned to the division of the coal fields, where he will work in connection with Mr. Winslow. Having had special training for such work in geology, we may expect valuable results from Mr. Harris' observations.

RELATION OF ASSISTANTS TO ECONOMIC WORK.

For the purpose of showing the relations of the survey to economic work in general, the following circular of instructions to the assistants is published herewith:

INSTRUCTIONS TO ASSISTANTS.

1. No member of the survey, whether permanent or tem-

porary, will be permitted to have a personal interest in any property in the State upon which the survey has or may have to report.

2. Information received from citizens regarding mineral or other properties of value must be held as strictly confidential.

3. Assistants will examine and report upon mineral or other properties for private individuals only when such work is in the direct line of the investigations in their charge, and then values must be reported through the State Geologist.

4. Any member of the survey disregarding the above instructions will be dismissed.

RELATIONS OF THE SURVEY TO PRIVATE WORK.

The State Geologist receives many requests to assay and analyze specimens of ores, minerals, etc. It is hoped that the following circular will make clear to all the relations that must necessarily exist between the survey and work of this character.

CIRCULAR.

The present circular is issued for the guidance of citizens of Arkansas who may desire to submit specimens of rocks, ores, minerals, soils, etc., to the State Geologist.

1. Packages should be addressed to the State Geologist, Little Rock, Ark.

2. Specimens sent, whether by mail or express, should be fully prepaid. Letters requiring answers should enclose postage for reply.

3. The name and address of the sender should accompany the package, and the township, range, section and quarter from which it comes should be given. If the matter is of importance, it will be regarded as confidential.

4. Much of the material sent in is, upon its face, valueless, while in other cases there is doubt which can only be determined by chemical examination. In cases where no critical

examination is required, the State Geologist will give his opinion regarding the specimens, and where an assay or analysis is necessary he will, if desired, make suggestions as to the advisability of having assays or analyses made.

5. It should be borne in mind, however, that the State Survey is not at liberty to make these examinations, either gratuitously or for a consideration. Inasmuch as many persons fail to understand why the survey cannot do such work, some of the reasons are here given:

First. The survey cannot know where the specimens come from that are sent in by others than its own members, and can therefore never draw trustworthy conclusions from them.

Second. In many cases material is sent in of which it would be a waste of time to make a detailed examination, and in other cases alloys and artificial products are sent which would require more time than the cases warrant.

Third. If the survey were at liberty to do private work, it would be possible for a single individual or company to take up the entire time of the chemist and the chemical laboratory in doing his or its private work to the exclusion of all other. A person having interests outside of the State might hand in an immense amount of material for examination, and the State of Arkansas would thus be conducting a chemical laboratory for his exclusive benefit.

Fourth. The chemical work absolutely essential to the successful operation of the survey occupies the full time of the chemist.

FINANCES.

The law creating the Geological Survey makes no provision for more than three regular paid assistants, and whatever temporary or other aid is needed must be paid for out of the survey's contingent fund. The first drafts upon such a fund must necessarily be very large to pay for the fitting up of a chemical laboratory, the purchase of all the instruments and apparatus, office furniture, cases for storing material, etc., all of which are essential in the first stages of such an undertaking. The contingent fund has also been obliged to bear certain expenses that were evidently not anticipated by the friends of the bill, such as room rent, gas, fuel, etc. This, however, has been unavoidable on account of the survey being obliged to seek rooms outside of the State House, all the available room in that building being already occupied.

These matters are referred to in order to show how certain lines of work, which might have been undertaken under more favorable financial circumstances, must be left for the present, at least, for lack of necessary funds.

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